# Ground-Based Midcourse Defense (GMD)

## SUMMARY

- Ground-Based Midcourse Defense (GMD) assets required for limited defensive operations are in place.
- Limited end-to-end system-level test data precludes characterizing GMD capabilities with confidence.
- Test data indicate that some limited defensive capability likely exists.
- System development and integration issues indicate that the system is still maturing.
- Continued progress developing the Test Bed will increase flexibility for future testing options.

*GMD contains a fire control system, sensors, and Ground-Based Interceptors.*

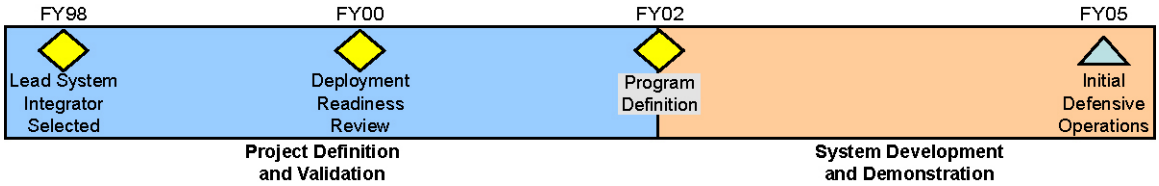
## SYSTEM DESCRIPTION AND MISSION

The GMD mission is to negate long-range ballistic missiles in midcourse of their trajectory. GMD accomplishes this by launching a maneuvering kill vehicle that intercepts the threat warhead outside the atmosphere. GMD contains a fire control system, sensors, and Ground-Based Interceptors. The GMD Fire Control and Communications network links the element components via fiber optic links and satellite communications. There are two GMD Fire Control and Communications control nodes: one at Fort Greely, Alaska, and one at Colorado Springs, Colorado. MDA uses an additional control node at the Reagan Test Site to support flight-testing. The Reagan node is not currently part of the operational configuration.

Several long-range sensors provide target detection and tracking. The Cobra Dane early warning radar at Shemya, Alaska, and the upgraded early warning radar at Beale Air Force Base, California, are both part of the initial GMD system. In December 2005, the program plans to deploy a sea-based X-band radar. The sea-based radar will add flexibility and capability for conducting more complex testing. It should also significantly increase BMDS capability to engage potential threats when deployed as an operational sensor. The ground-based radar prototype at Kwajalein Atoll is a risk reduction effort for the sea-based X-band radar and currently supports test events.

MDA is installing Ground-Based Interceptors at two missile fields for the initial configuration of the BMDS. MDA installed six Ground-Based Interceptors at Fort Greely between July and November 2004. Two Ground-Based Interceptors should be emplaced at Vandenberg Air Force Base, California, by the end of December 2004. These early Ground-Based Interceptors use Orbital Sciences Corporation boosters and Raytheon exoatmospheric kill vehicles.

## TEST AND EVALUATION ACTIVITY




MDA focused on system-level test events in FY04 to provide data for characterizing the Limited Defensive Operations capability. The test events included System Integration and Checkout (SICO) exercises, Integrated Ground Tests (IGT), Pacific Explorer exercises, and targets of opportunity. The primary purpose of SICO exercises was to confirm that the

elements of the BMDS could function as an integrated system. IGT-2 and IGT-4a/b were higher fidelity hardware-in-the-loop tests designed to characterize performance of the GMD system in several engagement sequences. Military operators have participated throughout these tests to confirm human-in-control functions. At the conclusion of SICO-6a, warfighters executed Missile Defense Integration Exercise (MDIE-4b) using operational procedures on mission equipment.

MDA conducted two non-intercept flight-tests in FY04, each using a different booster design. The Boost Vehicle-5 test event on January 9, 2004, was a successful test of the Lockheed Martin prototype boost vehicle. On January 24, 2004, Integrated Flight-test (IFT)-13B successfully tested the Orbital boost vehicle that will be used for Limited Defensive Operations. IFT-13B was a system-level mission that included participation from the Command, Control, Battle Management, and Communications (C2BMC), Aegis, and warfighters participating at key positions issuing engagement commands.

IFT-13C is the next planned flight-test and will exercise the Limited Defensive Operations system. While an intercept is not a test objective, a successful intercept could occur. MDA will launch the target from Kodiak, Alaska, and the Ground Based Interceptor from Kwajalein Atoll in the Marshall Islands. IFT-13C will be first system-level flight-test to use the Kodiak, Alaska, facility to launch a target missile. IFT-13C will also be the first flight-test using the Limited Defensive Operations-configured Ground-Based Interceptor hardware and software. This flight-test will provide new engagement geometry against a dynamic target. MDA has rescheduled IFT-13C several times due to manufacturing and design problems discovered during ground testing. Before announcing the reschedules, MDA provided DOT&E details on the rationale for each reschedule. DOT&E concurred with each reschedule.

**TEST AND EVALUATION ASSESSMENT**

System-level test events have demonstrated basic BMDS functionality. Military operator personnel participated effectively, and demonstrated proficiency with the system. Delays in the flight-test program have put some of the ground test results at risk, since simulations used in ground testing require flight-test data for validation. MDA has not yet confirmed hardware and software changes in the Limited Defensive Operations interceptors through flight-testing. Limited availability of end-to-end system-level test data precludes characterizing GMD capabilities with confidence.

Test capabilities and range safety issues continue to limit test realism. The location and orientation of legacy radars relative to the flight-test range require GMD to use other means to provide midcourse tracking data. IFT-13C will be the first flight-test to include data from a realistic midcourse sensor. While still not an end-to-end test of the Cobra Dane radar, IFT-13C will use Global Positioning System data from the target to stimulate a Cobra Dane radar simulator to provide midcourse tracking data to the GMD fire control system. MDA will conduct the first flight-test that exercises end-to-end midcourse sensor performance in FY05, using the upgraded Beale early warning radar to track a target out of the Kodiak launch facility. This new Kodiak target launch capability, and the addition of the Sea-Based X-band radar in FY05, will increase the Test Bed capability and allow more engagement geometries to be tested.

The GMD program has demonstrated the technical feasibility of hit-to-kill intercepts against reentry vehicles in limited target complexes. The Test Bed architecture is now in place and should have some limited capability to defend against a threat missile from North Korea. Kill vehicle performance against threat representative targets remains a high priority test objective for future testing. Testing delays reflect the significant challenges of integrating a complex, globally distributed system with prototype components.